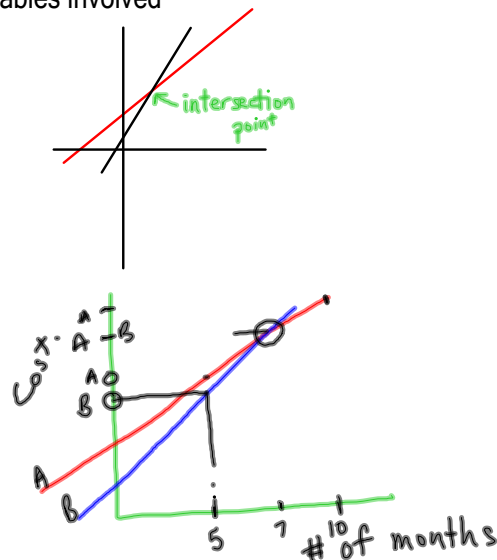


# 3.3 - Decision Making and Patterns

Curriculum Outcomes	Related Activities	Page in Text
<ul style="list-style-type: none"> <li>• apply properties of numbers when operating upon expressions and equations</li> <li>• model (with concrete materials and pictorial representations) and express the relationships between arithmetic operations and operations on algebraic expressions and equations</li> <li>• sketch graphs from words, tables, and collected data</li> <li>• identify, generalize, and apply patterns</li> <li>• describe real-world relationships depicted by graphs, tables of values, and written descriptions</li> <li>• interpret solutions to equations based on context</li> <li>• investigate and find the solution to a problem by graphing two linear equations with and without technology</li> <li>• solve equations using graphs</li> <li>• solve linear and simple radical, exponential, and absolute value equations and linear inequalities</li> <li>• explore and describe the dynamics of change depicted in tables and graphs</li> <li>• investigate and make and test conjectures concerning the steepness and direction of a line</li> </ul>	<p>Investigation and Focuses to have students explore and develop a process by which they can:</p> <ul style="list-style-type: none"> <li>• develop and equation in the form, <math>ax + b = cx + d</math></li> <li>• solve equations in the form, <math>ax + b = cx + d</math></li> <li>• interpret the solution to an equation in the form <math>ax + b = cx + d</math> to ensure it is reasonable in the original problem</li> </ul>	<p>111</p> <p>113</p> <p>115</p>

## Terms:

- Intersection Point  
-The point where the graph of 2 equations cross
- Identity  
-An equation that is true for all values of variables involved



## Investigation 4: Making Decisions (Pg.111)

Two Internet providers have gone into business in your rural area. You receive flyers from them. Your home business needs Internet service and you decide to choose one of the two companies.

Company A - \$20.00 per month and \$2.00 per hour

Company C - \$10.00 per month and \$2.50 per hour

For what number of hours of Internet use are the costs the same?

### Purpose

Choose an Internet provider by developing a strategy that builds upon the skills ou developed in Section 3.2.

## What Skills Have We Developed?

- Creating a Table Of Values
- Creating a graph from the TOV
- Creating an equation for a situation
- Solving the equation for a situation

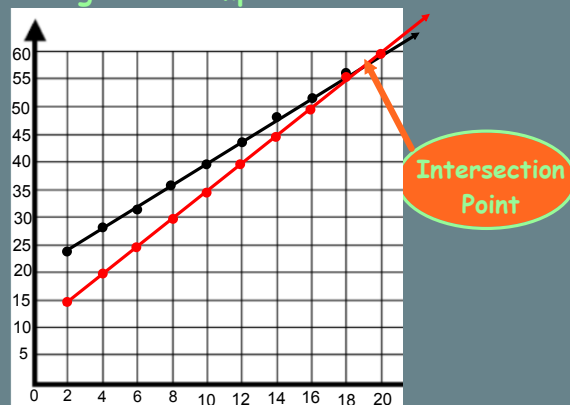
Two Internet providers have gone into business in your rural area. You receive flyers from them. Your home business needs Internet service and you decide to choose one of the two companies.  
Company A - \$20.00 per month and \$2.00 per hour  
Company C - \$10.00 per month and \$2.50 per hour  
For what number of hours of Internet use are the costs the same?

Pg.111

Create a table of values for both companies:

COMPANY A		COMPANY C	
# of hours (h)	Cost in \$ (c)	# of hours (h)	Cost in \$ (c)
2		2	
4		4	
6		6	
8		8	
10		10	
12		12	
14		14	
16		16	
18		18	
20		20	

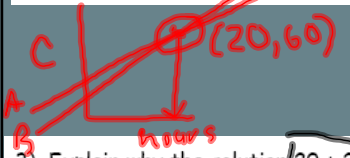
Create a graph showing both companies:



Steps:

- ① Turn stat plots off. (except #5)  
 $2^{nd} \ y =$  enter > enter  
 $y_1 = 20 + 2x$  → Alpha  
 $y_2 = 10 + 2.5x$  → 5to>  
 $y_3 =$   
no spaces
- ③ Window  
 $\left. \begin{array}{l} 0 \\ 50 \\ 100 \end{array} \right\}$
- ④ graph
- ⑤ 2nd Trace → #5 Enter  
 First curve? →  
 $y = 15 + 1.5x$  → graph  
 $y = 20 + 1x$  → graph  
 intersection  
 $x = 30$  /  $y = 50$

2) The graphs of the two relationships cross. What do the coordinates of the intersection point tell you about the problem? Is this solution accurate?  $x = 20$   $y = 60$


 $(20, 60)$  @20hrs → \$60.00  
 Both plans cost

3) Explain why the solution  $20 + 2h = 10 + 2.5h$  would provide an exact solution for this problem. ✓

$$\begin{array}{r} 20 + 2h = 10 + 2.5h \\ -2h \quad -2h \\ \hline 20 = 10 + 0.5h \\ -10 \quad -10 \\ \hline 10 = 0.5h \\ \hline 20 = h \end{array}$$

$y = 20 + 2h = 60$   $x = 20$

4) Which plan would be less expensive for someone who uses the Internet for about 12h per month?

$$\begin{array}{l} y = 20 + 2h \\ y = 10 + 2.5h \end{array}$$

5) Which Internet provider do you think your school should select? Why? List any assumptions that you made.

6) After how many hours does Company A become less expensive than Company C?

Pg. 112

#4 a) (10, 30)

b)  $y = 3x$   $y = 10 + 2x$  "Solve"

$$\begin{array}{r} 3x = 10 + 2x \\ -2x \quad -2x \\ \hline x = 10 \end{array}$$

(10, 30)

$y = 3x$   
 $y = 3(10)$   
 $y = 30$

#5) a) 

x	y = 6x + 3	y	x	y = 5x + 5	y
0	6(0) + 3	3	0	5(0) + 5	5
1	6(1) + 3		1	5(1) + 5	
2	6(2) + 3		2		
3	6(3) + 3		3		
4	6(4) + 3		4		

→ graph both lines on same grid  
 → where are they equal? (x, y)

(2, 15)

#8)  $y = 5x$   $y = 60 + 3x$

a)  $5x = 60 + 3x$   
 $-3x \quad -3x$   
 $\frac{2x}{2} = \frac{60}{2}$   
 $x = 30$

You would need to rent 30 videos in one year.

$y = 5x$   
 $y = 5(30)$   
 $y = 150$

b)  $\$1/\text{year}$   
 $y = 5(24)$   
 $y = \$120$

$y = 60 +$   
 $y = 60 +$   
 $y = \$1$

### Classwork/Homework

Do Questions Pg. 112

#4 a, b

#5, 6a, 8

#9 a

Do Question Pg. 115 #

18

Do Question Pg. 116 #

22, 23

Show your work!

9.11.2  
#4) a) (10, 30)

$$\begin{array}{r} 3x = 10 + 2x \\ -2x \quad -2x \\ \hline x = 10 \end{array} \quad \begin{array}{l} y = 10 + 2x \\ y = 10 + 2(10) \\ y = 30 \end{array}$$

#5) a)  $6x + 3 = 5x + 5$

$$\begin{array}{r} 6x + 3 = 5x + 5 \\ -5x \quad -5x \\ \hline 1x + 3 = 5 \\ -3 \quad -3 \\ \hline x = 2 \end{array} \quad \begin{array}{c|c|c} x & y = 6x + 3 & y \\ \hline 0 & 6(0) + 3 & 3 \\ 1 & 6(1) + 3 & 9 \\ 2 & 6(2) + 3 & 15 \\ 3 & 6(3) + 3 & 21 \\ 4 & 6(4) + 3 & 27 \end{array}$$

#8, 18, 22, 23, 19, 20

$$\begin{array}{c|c|c} x & y = 5x + 5 & y \\ \hline 0 & 5(0) + 5 & 5 \\ 1 & 5(1) + 5 & 10 \\ 2 & 5(2) + 5 & 15 \\ 3 & 5(3) + 5 & 20 \\ 4 & 5(4) + 5 & 25 \end{array}$$

8 a)  $y = 5x$   $y = 60 + 3x$

$$\begin{array}{r} 5x = 60 + 3x \\ -3x \quad -3x \\ \hline 2x = 60 \\ \frac{2x}{2} = \frac{60}{2} \\ x = 30 \end{array} \quad \begin{array}{l} \text{"same"} \\ \text{The cost would} \\ \text{be the same if} \\ \text{you rented 30 videos} \end{array}$$

\$150

b) 2/month  $\rightarrow$  24/year

$$\begin{array}{l} y = 5x \\ y = 5(24) \\ y = 120 \\ \$120 \end{array} \quad \begin{array}{l} y = 60 + 3x \\ y = 60 + 3(24) \\ y = 60 + 72 \\ y = 132 \\ \$132 \end{array}$$

Austin Videos offers the better deal.

c) Austin video is better up to 30 rentals.

9.11.2  
4. a) (10, 30)

$$\begin{array}{r} 3x = 10 + 2x \\ -2x \quad -2x \\ \hline x = 10 \end{array} \quad \begin{array}{l} y = 3x \\ y = 3(10) \\ y = 30 \end{array}$$

5. a)  $6x + 3 = 5x + 5$

$$\begin{array}{r} 6x + 3 = 5x + 5 \\ -5x \quad -5x \\ \hline 1x + 3 = 5 \\ -3 \quad -3 \\ \hline x = 2 \end{array} \quad \begin{array}{l} 6(2) + 3 \\ 12 + 3 \\ 15 \\ y = 15 \end{array}$$

(2, 15)

$$\begin{array}{r} 4x - 5 = 2x + 3 \\ -2x \quad -2x \\ \hline 2x - 5 = 3 \\ +5 \quad +5 \\ \hline 2x = 8 \\ \frac{2x}{2} = \frac{8}{2} \\ x = 4 \end{array} \quad \begin{array}{l} 4(4) - 5 \\ 16 - 5 \\ 11 \\ y = 11 \end{array}$$

(4, 11)

6. b)  $6x + 3 = 5x + 5$

8 Austin Video:  $y = 5x$   
Babatunde Movie Mania:  $y = 60 + 3x$

$$\begin{array}{r} 5x = 60 + 3x \\ -3x \quad -3x \\ \hline 2x = 60 \\ \frac{2x}{2} = \frac{60}{2} \\ x = 30 \end{array} \quad \begin{array}{r} 30 \\ \hline \end{array}$$

24

$$\begin{array}{l} y = 5(24) \\ y = 120 \\ \$120 \end{array} \quad \begin{array}{l} y = 60 + 3(24) \\ y = 60 + 72 \\ y = 132 \\ \$132 \end{array}$$

~~14~~ (9)  $2x + 6 = \frac{2}{3}(9 + 3x)$

$$2x + 6 = \frac{18}{3} + \frac{6x}{3}$$

$$\underline{2x + 6 = 6 + 2x}$$

They are the same.

(22) Option 1:  $y = 5 + .10x$   
 2:  $y = 3 + 0.12x$

$$\begin{array}{r} 5 + 0.10x = 3 + 0.12x \\ -0.10x \quad -0.10x \\ \hline 5 = 3 + 0.02x \end{array}$$

$$\begin{array}{r} 5 = 3 + 0.02x \\ -3 \quad -3 \\ \hline 2 = 0.02x \end{array}$$

$$\begin{array}{r} 2 = 0.02x \\ \hline 0.02 \quad 0.02 \\ \hline \end{array}$$

100 km

$x = 100$

Pg. 115-116

#18)  $y = 3x$   $y = 80 + 1x$   
 $3x = 80 + 1x$  Solve for  $x$   
 $-1x \quad -1x$   
 $\frac{2x = 80}{2} \quad x = 40$

The cost would be the same for 40 visits

#19)  $y = 6x - 8$   $y = 5x - 3$   
 $6x - 8 = 5x - 3$   
 $-5x \quad -5x$   
 $1x - 8 = -3$   
 $+8 \quad +8$   
 $x = 5$

$y = 6x - 8$   
 $y = 6(5) - 8$   $y = 22$   
 $y = 30 - 8$

20)  $y = 3(1.5x + 3)$   $y = 4(\frac{3}{4}x)$   
 $3(1.5x + 3) = 4(\frac{3}{4}x)$   
 $4.5x + 9 = 3x$   
 $-3x \quad -3x$   
 $1.5x + 9 = 0$   
 $-9 \quad -9$   
 $\frac{1.5x = -9}{1.5} \quad \frac{-9}{1.5} \quad \boxed{x = -6}$

22)  $y = 5 + 0.10x$   $y = 3 + 0.12x$   
 $5 + 0.10x = 3 + 0.12x$   
 $-0.10x \quad -0.10x$   
 $5 = 3 + 0.02x$   
 $-3 \quad -3$   
 $2 = 0.02x$   
 $\frac{2 = 0.02x}{0.02} \quad \frac{2}{0.02} \quad x = 100$

Pg. 115-116 #18, 19, 20, 22, 23

18)  $y = 3x$      $y = 80 + 1x$   
 $3x = 80 + 1x$   
 $-1x$      $-1x$   
 $2x = 80$      $x = 40$

The cost would be the same for 40 visits

19)  $y = 6x - 8$      $y = 5x - 3$   
 $6x - 8 = 5x - 3$   
 $-5x$      $-5x$   
 $x - 8 = -3$      $x = 5$

20)  $y = 3(1.5x + 3)$      $y = 4\left(\frac{3}{4}x\right)$   
 $3(1.5x + 3) = 4\left(\frac{3}{4}x\right)$   
 $4.50x + 9 = 3x$   
 $-4.50x$      $-4.50x$   
 $9 = -1.5x$      $y = 4\left(\frac{3}{4}x\right)$   
 $-1.5$      $-1.5$   
 $x = -6$

22)  $y = 5 + 0.10x$      $y = 3 + 0.12x$   
 $5 + 0.10x = 3 + 0.12x$   
 $-0.10x$      $-0.10x$   
 $5 = 3 + 0.02x$   
 $-3$      $-3$   
 $2 = 0.02x$   
 $0.02$      $0.02$   
 $x = 100$

The two options would be the same for 100km.

### Section 3.2 & 3.3 Quiz Review:

- Solving equations without fractions
  - no brackets
  - brackets (distributive property)
- Solving equations with fractions
  - no brackets: 1 denominator  
more than 1 denominator
  - brackets (distributive property)
- Problem solving with equations
- Intersection points of 2 equations

## Sections 3.2 & 3.3 Quiz Review

## Warm Up:



An outdoor swimming pool opens for 14 weeks each year. There are two payment choices:

- you can pay \$3.00 each visit; or
- you can buy a season pass for \$80.00 and pay \$1.00 per visit.

$$y = 3x$$

$$y = 80 + 1x$$

For what number of visits would the cost be the same?

$$\begin{array}{r} 3x = 80 + 1x \\ -1x \quad -1x \end{array}$$

$$2x = 80$$

$$x = 40$$

It would cost the same for 40 visits.

6. The Hilton's are heading to Fredericton on vacation for 10 days. They will drive 100 kilometers a day for the next 10 days. They can either rent from Avis, who will charge them \$25 per day plus .05 per kilometer, or Budget, who will charge \$60 per day with unlimited kilometers for the entire 10 days.
- Which company will be the cheapest?
  - Is there an amount of kilometers that they can travel when it will cost the same, no matter which company is selected?

$$\begin{aligned} \text{Avis } C &= 25x + 0.05y \\ C &= 25(10) + 0.05(1000) \\ C &= 250 + 50 \\ C &= \$300 \end{aligned}$$

$$10 \cdot 100 = 1000 \text{ km}$$

$$\begin{aligned} \text{Budget } C &= 60x \\ &= 60(10) \\ &= \$600 \end{aligned}$$

Avis

$$\begin{aligned} 250 + 0.05x &= 600 \\ 0.05x &= 350 \\ x &= \end{aligned}$$



6. The Hilton's are heading to Fredericton on vacation for 10 days. They will drive 100 kilometers a day for the next 10 days. They can either rent from Avis, who will charge them \$25 per day plus .05 per kilometer, or Budget, who will charge \$60 per day with unlimited kilometers for the entire 10 days.

$$\text{Total} = 1000 \text{ km}$$

a. Which company will be the cheapest?

b. Is there an amount of kilometers that they can travel when it will cost the same no matter which company is selected? X

a

Avis

$$C = 25(10) + 0.05(1000)$$

Budget

$$C = 60(10)$$

b

$$C = 25(10) + 0.05x$$

$$C = 250 + 0.05x$$

$$C = 60(10)$$

$$C = 600$$

## Attachments

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Equations.doc

Equation Riddles.doc

Solving for an Unknown 1.doc

Solving for an Unknown 2.doc

Word Problems Practice.doc

Writing word problems.doc

Math 10 Review 3.1, 3.2 & 3.3.doc

Section 3.2 & 3.3 Quiz Review.doc